The remainder of the book is concerned with the applications to geology, and a final chapter treats of tactical interpretation. It is a pioneering work in the geological field, and it is assumed that the student has had introductory courses in geology and elementary mineralogy and lithology. It should not be assumed, however, that it is only of use to the geologist, for geological structure determines other surface characteristics, and interpretation of the geological features shown in aerial photographs may be of much value for use in other fields. The strict geological interpretation is based on a thorough background of field geology, but a simple knowledge of geological characteristics is of help for general interpretation.

The man versed in the science of photogrammetry will find much lacking in the book. But it is not for him, and the selection of elementary material has been judiciously made and results in a good introduction to the interpretation of aerial photographs. It is to be expected that with the rapid changes going on in aerial photography, some sections, such as that dealing with apparatus, are somewhat out of date, but little is lost as a result. Not enough study has yet been made of infrared and color photography from the air to be able to state definitely that they are of importance, but one feels that some mention of the work already done in these fields should have been made. They show much promise. As in most books on this subject, one of the most important and fundamental aspects is but slightly touched, that is, the characteristics of photographic films and processing desirable for the production of negatives suitable for aerial photographic interpretation. It is far too easy to make a bad photograph—or, rather, we should perhaps say it requires much knowledge and experience to produce the best kind of photograph. Far too few people have that knowledge. It is to be hoped that the next edition of the book under review, which is otherwise very good, will include an authoritative chapter on the desirable photographic materials and their characteristics.

WALTER CLARK

SPECIAL ARTICLES

THE ANTIGENICITY OF PROTEIN ISOLATED FROM BOVINE SERUM AFTER BRIEF TREATMENT WITH ALKALI[1]

IN a recent publication, Lewis[2] states that "beef plasma which had been incubated one hour or longer with 0.5 normal sodium hydroxide and then neutralized was no longer antigenic when tested by gross anaphylaxis or by the more sensitive method using uterine strips from guinea pigs sensitized to native beef plasma." If we interpret this statement correctly, tests for antigenicity were carried out by using native plasma as the sensitizing antigen and alkali-treated protein as the shocking material. Apparently these results were interpreted to indicate a complete loss of antigenicity after treatment of the plasma with alkali. Obviously, however, it can not be decided from these data whether the results obtained were due to a change in antigenic specificity or to a loss of antigenicity. It has been our experience that protein isolated from bovine serum after exposure to 1 N alkali at room temperature for periods as long as 8 hours is still antigenic, although its antigenic specificity usually is altered by the alkaline treatment. Some of the data in support of our conclusions are included in this paper. A more detailed report will be published elsewhere at a later date.

The antigenicity of alkali-treated egg albumin,[3,4,5] horse serum,[6,7,8] zein,[5] edestin,[5] casein[5], and beef serum[8,9] has been studied by several investigators. In general, these studies have indicated that prolonged treatment with alkali will abolish antigenicity. However, Landsteiner and Barron[6] found that the protein isolated from horse serum treated with 1 N sodium hydroxide for 16 hours still gave weak complement fixation and precipitin reactions with homologous antiserum. Johnson and Wormall[7] reported similar results; treatment of horse serum at pH 13 or above for about 24 hours was required to abolish antigenicity.

Studies in these laboratories have indicated that the protein isolated from bovine serum treated with 1 N sodium hydroxide for 27 hours at room temperature apparently is non-antigenic.[9] The tests that have been employed for antigenicity include active anaphylaxis, passive anaphylaxis, complement fixation, and precipitin reactions. However, this material is not suitable for use in human therapy, since it is fatal to guinea pigs when given intravenously in doses of 35 mg per kg or larger. Lewis[2] stated that products prepared

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by treating bovine plasma with 0.5 N sodium hydroxide at 37° C. for periods longer than 8 hours were toxic when injected into guinea pigs, although such products were non-antigenic by the criteria employed.

We have tested also preparations isolated after treatment of bovine serum with 1 N sodium hydroxide at room temperature for periods of 1 hour, 2 hours, 4 hours and 8 hours. None of these preparations appeared to be toxic when administered intravenously to guinea pigs in doses as large as 300 mg per kg. The materials isolated after 1 hour and 2 hours (but not those isolated after 4 hours and 8 hours) gave weak precipitin tests with an antiserum prepared by injecting untreated bovine serum into rabbits. These same materials gave negative tests with other potent antisera prepared in the same way. However, we have been successful in preparing antisera to each of these 4 materials by intermittent intravenous injection into rabbits for periods of from 21 to 99 days. It is interesting that untreated bovine serum and all 4 of the alkali-treated materials gave positive precipitin tests with each of the antisera prepared with the alkali-treated proteins. Guinea pigs passively sensitized with antiserum prepared with protein isolated after treatment of serum for 2 hours with alkali were shocked with each of the other alkali-treated preparations (except the preparation treated for 1 hour, which was not tested) and with untreated bovine serum.

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A PHYSICAL DEFICIENCY IN THE RATION OF RUMINANTS

THAT ruminants do not thrive on a ration limited to concentrates is well known. Several investigators have attempted to determine the deficiencies associated with such a diet.[1,2,3,4,5,6] Mead and his coworkers[4,5,6] found that calves could be carried through growth, pregnancy and lactation if cod-liver oil and calcium carbonate were added to a common concentrate mix. These animals could not, however, be considered normal, for it was necessary to limit their food consumption to avoid bloat. Despite precautions, four of the animals died of this cause. Johnson and his associates[7] fed calves a purified diet, adding Cellophane to make the ration more bulky. They state: "The growth rates of the 15 calves studied were below normal in most cases in comparison with Ragsdale's Standards. Poor food consumption associated with periodic digestive upsets seemed to be largely responsible for the slow growth."

As we have duplicated several of the symptoms observed on a diet of concentrates simply by fine grinding of roughage, it appears that a concentrate diet has physical as well as chemical or nutritive deficiencies. Several workers have considered that the mere lack of bulk might be a limiting factor in a concentrate diet for ruminants. The addition of soft bulky material such as paper pulp[6] or Cellophane[7] had, however, little beneficial effect. Rather, the limiting physical factor in a concentrate diet appears to be the absence of the coarse sharp material necessary to stimulate nerve fibers terminating in the ruminal mucosa. In experiments with cattle and sheep, finely ground alfalfa hay was compared with whole alfalfa, each being given in conjunction with concentrates. The concentrates and hay were fed in approximately equal proportions. The concentrate mixture consisted of rolled barley 60 per cent.; wheat bran 25 per cent.; soybean meal 12.5 per cent.; NaCl 2.5 per cent. The animals received all they would consume over a feeding period of approximately 8 hours. Since the chemical constituents of the two rations were the same, any discrepancies in response should depend upon the physical condition of the feed—whether ground or whole.

The following disorders were noted only when finely ground alfalfa was fed:

(1) Rumination occurred very irregularly or not at all. This is in line with the finding of Schalk and Amadon[8] that coarse material in the rumen stimulates rumination. Fine grinding so effectively breaks down the alfalfa stems that their irritating effect is largely lost.

(2) Bloat occurred frequently in cattle, but only once in a sheep. Twenty-one cases of bloat were encountered in 4 cows receiving the ground alfalfa hay over a 15-day period. This finding supports the postulate[9] that bloat results from a lack of sufficient coarse irritating roughage to induce the eructation reflex.

(3) Food consumption in cows was reduced as compared with consumption of whole alfalfa. This reduction amounted to 6.9 pounds daily per animal. The reduced consumption by cows receiving finely ground hay was largely due to the fact that, after consuming a large amount on one day, they were off-feed

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